10. (currently amended): ~~A~~ The radiation detector according to claim 9, ~~characterized in that~~ with a capacitor ~~is~~ connected between the first ~~transistor~~ electrode of the transistor and the common bus.

11. (currently amended): ~~A~~ The radiation detector according to claim 9 ~~and/~~ or 10, ~~characterized in that~~ with a resistor ~~is~~ connected between the ~~transistor~~ first electrode of the transistor and the radiation-sensitive element.

REMARKS

Claims 1-11 are amended. Claims 1-11 are pending in the application.

As an initial matter, the undersigned points out that the correct order of the applicants' names, FIRST, MIDDLE, LAST, is as follows:

VYACHESLAV ALEXANDROVICH DANILOV

VICTOR IVANOVICH KOZUS

In the Declaration, the order of Applicants' names has the last name first, as is used in the U.S. PCT Receiving Office and in the Belarus Patent Office. Applicants request correction to the order of their names in the records of the Patent Office.

The Examiner noted that the listing of publications is not

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in proper format. Attached herewith is an Information Disclosure Statement and PTO form, with copies of the prior art, for proper citation of these documents to the Patent Office.

The Examiner objected to the title. A proposed replacement title is in the first page of this Amendment.

The Examiner objected to the claims due to certain informalities. The claims are amended, clarifying the informalities pointed out by the Examiner.

The Examiner rejected the claims under 35 U.S.C. § 112, as not meeting the requirement of enablement. The claims, as amended, meet the enabling requirement. More particularly, Applicants point out that claim 1 reads on FIG. 1. Claims 2 and 3 read on FIG. 2. Claim 4 reads on FIGS. 1, 2, and 3. Claim 5 reads on FIG. 4 and 5. Claim 6 reads on FIG. 6, and claim 7 reads on FIG. 7. Claim 8 reads on FIGS. 4, 5, 6 and 7. Claim 9 reads on FIGS. 8 and 9. Claim 10 reads on FIG. 9. Claim 11 reads on FIGS. 8 and 9. Accordingly, each claim enables the circuits depicted.

The Examiner rejected claims 1, 2 and 9, under 35 U.S.C. § 102(b),as being anticipated by U.S. patent No. 4, 355,335 to Imaide et al.

Regarding Claim 1, the Examiner states that Imaide et al. teach (see Fig. 1A) a radiation detector comprising a photodiode (3) and a load (12), with the load being connected to the photodiode through a signal contact (4) and to a common bus (17)

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at the other side, characterized in that the detector additionally comprises a transistor (6) and an interrogation pulse generator (2), with a second photodiode electrode (top of (3)) coupled with a second electrode (left electrode of (3)) of the transistor, a control (gate/middle electrode) electrode of the transistor coupled with the output of the interrogation pulse generator, and a third transistor electrode (right electrode of (3)) is coupled with the common bus.

Applicants respectfully point out, that Applicant believes the last statement by the Examiner, that the third transistor is coupled with the common bus, is incorrect. Applicants further distinguish Applicants invention on claims 1, below.

Regarding Claim 2, the Examiner states that Imaide et al. teach (see Fig. 1 A) N groups (a column) of elements, each consisting of the series-connected photodiode and transistor, placed in parallel with the load, and the interrogation pulse generator comprising N outputs each of the output being coupled with the transistor control electrode from the respective group of elements, where N is an integer > 1.

Regarding Claim 9, the Examiner states that Imaide et al. teach (see Fig. 1 A) a radiation detector comprising a radiation-sensitive element (3) and a load (12), with the sensitive element being connected to a supply voltage bus (ground) at one side and the load being connected to a common (17) bus at one side, characterized in that said detector

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additionally comprises a transistor (6) and an interrogation pulse generator (2), with the sensitive element being connected to a first electrode (left electrode of (3)) of the transistor at the other side and the output of the interrogation pulse generator being connected to the control electrode (gate/middle electrode) of the transistor, and a third transistor electrode (right electrode of (3)) coupled with the load signal contact.

Claim 1, as amended, includes the load connected to a first electrode of the photodiode and connected to a common bus, with the radiation detector including a transistor and an interrogation pulse generator, with a second electrode of the photodiode coupled to a first electrode of the transistor with a control electrode of the transistor coupled to an output of the interrogation pulse generator; and with a third transistor electrode coupled to the common bus. This claimed combination is not taught or suggested by Imaide et al.

Claim 2 is dependant from claim 1, and accordingly, includes all the elements of claim 1. Furthermore, claim 2 includes N groups of elements, each group of elements including a photodiode and a transistor, with the photodiode connected to the transistor in serial, with the photodiode and transistor connected in parallel with the load. This claimed combination is not taught or suggested by Imaide et al.

Claim 9, as amended, includes the radiation-sensitive element connected to a supply voltage bus and the load connected

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to a common bus, with the radiation detector including a transistor and an interrogation pulse generator, with the radiation-sensitive element connected to a first electrode of the transistor and an output of the interrogation pulse generator connected to a control electrode of the transistor, with a third electrode of the transistor coupled to the load. This claimed combination is not taught or suggested by Imaide et al.

The difference between Imaide et al. and the present invention is in connections. In Imaide et al., and other references, a photodiode is directly connected to a common bus, then to transistor and then to the load. In the present invention a photodiode is NOT connected to the bus, but connected to the load from the signal side of the transistor.

This type connection is not known in the art. This connection has a great effect, i.e. it allows to obtain a high degree of linearity and sensitivity, because the current of discharge, and re-charge, of the capacitance of a photodiode by the ionization of radiation is proportional to the value of ionization.

At the time of the action of interrogation impulse the transistor opens and the current flowing through the load is strictly proportional to the value of discharge, or overcharge, of the internal capacitance of the photodiode, or more broadly, radiation-sensitive element. At the same time the state of the

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photodiode is restored and it is not necessary to use additional reset keys, which must be used in Herbst et al. and other references.

The classical circuit and method of reading of the charge of the photodetector in Imaida et al. and other cases is based on the principle of measuring of discharge, or overcharge, by measuring of the voltage on the photodetector. It is known that the voltage-current characteristic of a diode is parabolic. So in the region of small charges the dependence of the measuring become non-linear, while the dynamic range and sensitivity of such detectors becomes limited.

The present invention has wide-range linearity. The dynamic range of the measured charges also is wider, especially in the region of small charges, or low level of radiation. The sensitivity of such detector is much higher.

The invention, for example, is used in the new radiographic system and allows obtaining high resolution images of a human body with sucha low level of radiation as a quantum limit for obtaining such images. (See enclosure). Such system allows reaching ten times lower dose of radiation at the procedure of fluorgraphy.

Accordingly, claims 1, 2 and 9 are not anticipated by Imaide et al.

The Examiner rejected claim 3 under 35 U.S.C. § 103, as being unpatentable over Imaide et al. In view of U.S. Patent No.

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3,535,526 to Henry et al. The Examiner states that Imaide et al. teach the detector in Claim 1, according to the appropriate paragraph above, but that Imaide et al. do not teach the detector comprising L loads, with Nj group of elements being placed in parallel with each i-th load, and the total number of groups of elements contained in said detector equals the number of N outputs of the interrogation pulse generator, where L is an integer > 1, Nj is a positive integer. The Examiner states that Henry et al. teach (see Fig. 2) a radiation detector comprising a phototransistor array such that the detector comprises L (# of rows) loads (20j) (see Col. 1, lines 46-52), with N, (# of columns) group of elements being placed in parallel with each i-th load, and the total number of groups of elements contained in said detector equals the number of N outputs of the interrogation pulse generator, where L is an integer > 1, Nj is a positive integer.

Claim 3 includes all the elements of claims 1 and 2. Accordingly, the foregoing arguments regarding claims 1 and 2, individually and jointly, are applicable to claim 3. Furthermore, the cited solution by the Examiner relates to a different field of art and is directed to a different aim from the present invention. In fact, there is used other element - phototransistor, not the photodiodes, and only the light flows are measured. Henry et al. measure only a light flows on certain photo-elements as a direct current. In Henry et al. the

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structure of photo-elements differs from the structure of photodiodes, and the control is not made by the impulse on the bus but by photo-currents. Henry et al. do not observe a storage of a signal or measure of a charge. In Henry et al. a photo-current is measured. The same problem is with non-linearity of voltage-current characteristics of photo-transistors. The voltage-current characteristic of a transistor, moreover, is more non-linear than that of a diode. Accordingly, claim 3 is not unpatentable over Imaide et al. in view of Henry et al.

The Examiner rejected claims 5, 6, and 10 under 35 U.S.C. § 103(a) as being unpatentable over Imaide et al. in view of U.S. Patent No. 4,338,515 to Herbst et al. The Examiner states that regarding Claims 5 and 6, Imaide et al. teach (see Fig. 1 A) a radiation detector comprising a radiation-sensitive element (3) and a load (12), with said sensitive element being connected to a supply voltage bus (ground) at one side, and the load being connected to a common bus (17) at one side, characterized in that said detector additionally comprises a transistor (6), and an interrogation pulse generator (2), and the output of the interrogation pulse generator is coupled with the control electrode of the transistor, with a third transistor electrode connected to the common bus. Regarding Claim 6, the Examiner states that Imaide et al. teach (see Fig. 1 A) N groups (a column) of elements, each consisting of the series-connected

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radiation-sensitive element and transistor, the common point of which is coupled to the load signal output, are connected between the supply voltage bus and common bus, and the interrogation pulse generator comprising N outputs each of the output being coupled with the transistor control electrode from the respective group of elements, where N is an integer > 1. The Examiner admits that Imaide et al. do not teach a capacitor with the sensitive element being connected to a first electrode of the transistor at the other side and to the first plate of the capacitor, the second plate of which is connected to a signal contact of the load. The Examiner further states that Herbst et al. teach (see Fig. 1) a detector with an array (see Fig. 6) of elements (SE), the elements comprising a radiation-sensitive element (FD), transistor (T1), load element (L), and interrogation pulse generator (supplying <j>2), also including a capacitor (cse) wherein the sensitive element is a supply voltage bus (ground) at one side and connected to the first electrode of the transistor at the other side and to the first plate (bottom) of the capacitor, the second plate of which is connected to a signal contact (E) of the load. The Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the capacitor setup of Herbst et al. in the detector of Imaide et al. (in view of Henry et al. for Claim 3), to stabilize the frequency characteristics of the optical signal so it is more

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accurately outputted to a readout.

Regarding Claim 10, the Examiner states that <u>Imaide et al.</u> teach the detector in Claim 9, according to the appropriate paragraph above. But the Examiner admits that Imaide et al. do not teach a capacitor connected between the first transistor electrode and the common bus. The Examiner states that <u>Herbst et al.</u> teach (see Fig. 1) a detector with an array (see Fig. 6) of elements (SE), the elements comprising a radiation-sensitive element (FD), transistor (Tl), load element (L), and interrogation pulse generator (supplying <j>2), also including a capacitor (C$E) connected between a first transistor electrode (left side of (Tl) and a common bus (E). The Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the capacitor setup of <u>Herbst et al.</u> in the detector of <u>Imaide et al.</u> (in view of Henry et al. for Claim 3), to stabilize the frequency characteristics of the optical signal so it is more accurately outputted to a readout.

The previous arguments regarding <u>Imaide et al.</u> for claims 1, 2 and 9 apply to claims 5, 6 and 10. Furthermore, the cited solution in <u>Herbst et al.</u> represents an analog-to-digital converter for a light flow. The circuit of the connection of a photodiode and a transistor in <u>Herbst et al.</u> is similar to <u>Imaide et al.</u> In this case the photodiode is also connected

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with a common bus and a reset key is required. The cited circuit in Herbst et al., which also measures the voltage on the photo-element, is a non-linear circuit. None of the art cited by the Examiner teach or suggest the present invention as set forth in claims 5, 6 and 10. Accordingly, claims 5, 6 and 10 are patentable.

The Examiner rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Imaide et al. in view of Herbst et al. as applied to Claim 6, further in view of Henry et al. Imaide et al. in view of Herbst et al. teach the detector in Claim 6, according to the appropriate paragraph above. Imaide et al. do not teach the detector comprising L loads, with N group of elements being placed in parallel with each i-th load, and the total number of groups of elements contained in said detector equals the number of N outputs of the interrogation pulse generator, where L is an integer > 1, Nj is a positive integer. The Examiner further states that Henry et al. teach (see Fig. 2) a radiation detector comprising a phototransistor array such that the detector comprises L (# of rows) loads (20j) (see Col. 1, lines 46-52), with Nj (# of columns) group of elements being placed in parallel with each i-th load, and the total number of groups of elements contained in said detector equals the number of N outputs of the interrogation pulse generator, where L is an integer > 1, Nj is a positive integer (see Fig. 2). The Examiner alleges that it would have been

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obvious to one of ordinary skill in the art at the time the invention was made to use multiple loads as taught by <u>Henry et al.</u> in the detector of <u>Imaide et al.</u>, to provide multiple simultaneous readouts for each row or detector of <u>Imaide et al.</u>, to provide multiple simultaneous readouts for each row or column in order to more quickly perform a single two-dimensional detection.

The arguments as set forth above, for claims 1, 2, 5, 6 and 9 are applicable to claim 7. Accordingly, claim 7 is patentable in view of the art cited by the Examiner.

Accordingly, all claims, as amended, are in condition for allowance. Applicants solicit allowance of the claims.

Applicants submit the attached information from their company CONSYS, which uses the present invention.

Applicants are a <u>**SMALL ENTITY**</u>.

Charge the Small Entity fee of $55.00 for the one month extension of time to Deposit Account No. 14-0783. Further, charge the fee of $180.00 for the enclosed Information Disclosure Statement to Deposit Account No. 14-0785. If any additional fees are due, then charge those fees to Deposit

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Account No. 14-0783. If any fees are paid in excess of those due, then credit those fees to Deposit Account No. 14-0783.

Respectfully submitted,

DAVID NEWMAN CHARTERED

By: David B. Newman Jr.

Date: October 27, 2003

David B. Newman, Jr.
Registration No. 30,966

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